IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the Patent Application of:	Group Art Unit: 2625
Yifeng Wu et al.	
Application No. 10/825,452	Examiner: Riley, Marcus T.
Filed: April 15, 2004	Confirmation No.: 8319
For: Image Processing System and Method	

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Appellant originally appealed from the final decision of the Examiner dated May 5, 2009. The Examiner has since reopened prosecution and issued two additional non-final actions. Having reviewed the grounds of rejection raised in the most recent non-final Office Action of June 24, 2010 (the "Office Action" or "Action"), Appellants hereby request re-instatement of the appeal in this application and files the present, updated Appeal Brief, along with a new Notice of Appeal, in support of the re-instated appeal.

I. Real Party in Interest

The real party in interest is Hewlett-Packard Development Company, LP, a limited partnership established under the laws of the State of Texas and having a principal place of business at 11445 Compaq Center Dr. W., Houston, TX 77070, U.S.A. (hereinafter "HPDC"). HPDC is a Texas limited partnership and is a wholly-owned affiliate of Hewlett-Packard Company, a Delaware Corporation, headquartered in Palo Alto, CA. The general or managing partner of HPDC is HPQ Holdings, LLC.

II. Related Appeals and Interferences

There are no appeals or interferences related to the present application of which the Appellant is aware.

III. Status of Claims

Claims 1-39 are pending in the application and stand finally rejected. Accordingly, Appellant appeals from the final rejection of claims 1-39, which claims are presented in the Appendix.

IV. Status of Amendments

No amendments to the specification, drawings, or claims have been made subsequent to the final Office Action of May 5, 2009, from which Appellant takes this appeal.

V. Summary of Claimed Subject Matter

The system includes a plurality of printing units, an image source, and a system processing unit. The image source provides a print job comprising a plurality of images to the system processing unit. The system processing unit receives the plurality of images in the print job from the image source, and calculates an image histogram for each image in the print job. The system processing unit then determines the similarity of the images in the print job by comparing the calculated histograms. The system processing unit then classifies the images into classes based on the comparison, and sends each class to a particular printer. By sending each class to a particular printer, similar images are printed on the same printer. This reduces undesirable print variations when printing similar images. (Appellant's specification, p. 1, line 30 – p. 2, line 8).

Appellant's independent claims recite the following subject matter.

Claim 1 recites:

A printing control system , comprising:

a plurality of printing units (12, 14, 16) (*Appellant's specification, p. 3, lines 1-23*);

an image source (20) providing a print job comprising a plurality of images (*Appellant's specification, p. 3, lines 16-32 – p. 4, lines 1-4*); and

a system processing unit (18), wherein the system processing unit (18) is configured to receive the plurality of images in the print job from the image source (20) (*Appellant's specification, p. 4, lines 5-12*), calculate an image histogram for each image in the print job (*Appellant's specification, p. 5, lines 11-19*), determine a similarity of the images in the print job by comparing the calculated histograms (*Appellant's specification, p. 7, lines 1-21*), classify the images into at least a first and a second class based on the similarity of the

histograms (120) (*Appellant's specification, p. 7, lines 22-27*), and send each of the images of the first class to a respective one of the printing units (120) (*Appellant's specification, p. 18, lines 4-10*).

Claim 19 recites:

A method of processing a print job including multiple images with a printing system including multiple printing units (12, 14, 16) (*Appellant's specification, p. 3, lines 1-23*), comprising:

identifying the number of printing units in the system, the system including at least a first printing unit (12) and a second printing unit (14) (*Appellant's specification, p. 3, lines 1-23*);

calculating a histogram for each image in the print job (*Appellant's specification, p. 9, lines 13-21*);

comparing the histograms of the images in the print job to determine similarity between the images (*Appellant's specification, p. 9, lines 12- 21*);

grouping the images into groups based on the similarity of the comparisons of the histograms (*Appellant's specification, p. 9, line 22 – p. 14, line 30*);

sorting the images in the groups into classes, including at least a first class and a second class (*Appellant's specification, p. 14, line 30 – p. 16, line 16*); and

sending the images to the printing units for printing, including sending the images from the first class to the first printing unit and sending the images from the second class to the second printing unit (*Appellant's specification, p. 16, line 17-29*).

Claim 29 recites:

A printing control system, comprising:

a plurality of printing units (12, 14, 16) (*Appellant's specification, p. 3, lines 1-23*);

an image source (20) providing a print job comprising a plurality of images (*Appellant's specification, p. 3, lines 16-32 – p. 4, lines 1-4*); and

processing means (18) for receiving the plurality of images in the print job from the image source (20) (*Appellant's specification, p. 4, lines 5-12*), for calculating an image histogram for each image in the print job (*Appellant's specification, p. 5, lines 11-19*), for comparing the calculated histograms and determining a similarity of the images in the print job (*Appellant's specification, p. 7, lines 1-21*), for classifying the images into classes based on the similarity of the comparison (*Appellant's specification, p. 7, lines 22-27*), and for sending each of the images in a class to a respective one of the printing units (*Appellant's specification, p. 18, lines 4-10*).

VI. Grounds of Rejection to be Reviewed on Appeal

The final Office Action raised the following rejection.

(1) Claims 1-39 were rejected under 35 U.S.C. § 103(a) over the combination of U.S. Patent No. 7,301,677 to Oyumi (hereinafter "Oyumi"), U.S. Patent No. 6,320,981 to Yada (hereinafter "Yada"), and U.S. Patent No. 6,185,335 to Karidi et al. (hereinafter "Karidi"). For at least the following reasons, this rejection should not be sustained.

Accordingly, Appellant hereby requests review of this rejection in the present appeal.

VII. Argument

(1) Claims 1-39 were rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 7,301,677 to Oyumi (hereinafter "Oyumi"), U.S. Patent No. 6,320,981 to Yada (hereinafter "Yada"), and U.S. Patent No. 6,185,335 to Karidi et al. (hereinafter "Karidi"). For at least the following reasons, this rejection should not be sustained.

Claims 1, 19, and 29:

Claim 1 recites:

> A printing control system, comprising:
> a plurality of printing units;
> an image source providing a print job comprising a plurality of images; and
> ***a system processing unit, wherein the system processing unit is configured to receive the plurality of images in the print job from the image source, calculate an image histogram for each image in the print job, determine a similarity of the images in the print job by comparing the calculated histograms, classify the images into at least a first and a second class based on the similarity of the histograms, and send each of the images of the first class to a respective one of the printing units.***

(Emphasis added).

Similarly, claim 19 recites:

> A method of processing a print job including multiple images with a printing system including multiple printing units, comprising:
> identifying the number of printing units in the system, the system including at least a first printing unit and a second printing unit;
> ***calculating a histogram for each image in the print job;***
> ***comparing the histograms of the images in the print job to determine similarity between the images;***
> ***grouping the images into groups based on the similarity of the comparisons of the histograms;***
> ***sorting the images in the groups into classes, including at least a first class and a second class; and***
> ***sending the images to the printing units for printing, including sending the images from the first class to the first printing unit and sending the images from the second class to the second printing unit.***

(Emphasis added).

Finally, claim 29 recites:

A printing control system, comprising:
a plurality of printing units;
an image source providing a print job comprising a plurality of images; and
processing means for receiving the plurality of images in the print job from the image source, for calculating an image histogram for each image in the print job, for comparing the calculated histograms and determining a similarity of the images in the print job, for classifying the images into classes based on the similarity of the comparison, and for sending each of the images in a class to a respective one of the printing units.

(Emphasis added).

In contrast, Oyumi, Yada and Karidi do not teach or suggest, separately or in combination, the subject matter of claim 1. As an initial matter, the Office Action states that claims 19 and 29 "contain[] substantially the same subject matter as claim 1 ," and "[t]herefore, claims[s] 19 and 29 are rejected on the same grounds as claim 1." (Action, p. 8). Appellant does not necessarily agree.

However, with regard to claims 1, 19, and 29, the cited references do not teach or suggest, separately or in combination, "[a] printing control system, comprising: a plurality of printing units, an image source providing a print job comprising a plurality of images, and a system processing unit, wherein the system processing unit is configured to receive the plurality of images in the print job from the image source, calculate an image histogram for each image in the print job, determine a similarity of the images in the print job by comparing the calculated histograms, classify the images into at least a first and a second class based on the similarity of the histograms, and send each of the images of the first class to a respective one of the printing units." (Claim 1). Oyumi generally teaches "an image forming system that is capable of making uniform in size printed images" by placing alignment marks on the borders of a ***printed page,*** and then using the alignment marks to print or realign the page for printing. (Oyumi, Abstract and col. 8, lines 40-50).

The Office Action asserts that the calibration and scanning of these alignment marks as taught by Oyumi teaches "calculate[ing] an image histogram (Fig. 9, Density Histogram) for each image in the print job." (Action, p. 3). This, however, is incorrect. Oyumi does not teach or suggest the calculation of any histogram of any image ***which is to be printed (i.e. in a print job)***. In contrast, Oyumi simply teaches locating existing alignment marks on a previously printed page by scanning the alignment marks and using a histogram to precisely locate the alignment marks. (Oyumi, col. 9 line 32-col. 10, line 49). These alignment marks cannot be reasonably interpreted as "a plurality of images in a print job" which are sent to a "printing unit" because *they are already printed* on the substrate. Thus, there is no way the system of Oyumi can calculate an image histogram for each image in a print job. Further, for the same reason, Oyumi cannot teach or suggest sending "each of the images of the first class to a respective one of the printing units" because the alignment marks already exist on the page.

Still further, Oyumi does not teach or suggest calculating an "image histogram for ***each image"*** in a "plurality of images in the print job." Specifically, Oyumi does not teach or suggest calculating an image histogram of the primary image. In contrast, Oyumi teaches "enlarging or shrinking" the primary image according to the position of the alignment marks (Oyumi, col. 6, lines 40-43).

Even still further, Oyumi does not teach or suggest sending "each of the images of the first class to a respective one of the printing units." In contrast, the quoted portions of Oyumi teach that "enlarge[ing] an image" then "distributing the enlarged image data to the respective printers." (Oyumi, col. 6, lines 40-43). Clearly this portion of Oyumi teaches distribution of a single image to multiple printers.

The Office Action then concedes that Oyumi does not teach or suggest "determining a similarity of the images in the print job by comparing the calculated histograms; [and] classifying the images into at least a first and a second class based on the similarity of the histograms." (Action, p. 4). Consequently, the Examiner cites Yada. However, Yada does not remedy the shortcomings of Oyumi. Specifically, Yada does not teach or suggest determining a similarity of images in a print job by comparing calculated histograms. In contrast, Yada is directed toward compressing digital images to reduce the amount of memory required in an image processing system. (Yada, col. 1, line 25-col. 2, line 55). To do this, Yada identifies various pixel areas and applies the appropriate compression algorithm to each area. (Yada, col. 2, lines 49-67). Applying compression algorithms to pixels has nothing to do with "determining a similarity of the image in the print job by comparing the calculated histograms" or "classifying the images into at least a first and second class based on the similarity of the histograms." (Claim 1). Yada is directed toward an entirely different problem (conserving memory space in an image processing system) and does not teach or suggest anything related to "determining the ***similarity of images in a print job.***"(Claim 1).

In light of the above-described deficiencies in Oyumi and Yada, the Office Action also concedes that Oyumi as modified by Yada "does not expressly disclose each of the images of the first class to a respective one of the printing units." (Action, p. 4). Consequently, the Examiner cites Karidi. However, Karidi does not remedy the shortcomings of Oyumi and Yada. Specifically, Karidi does not teach or suggest "send[ing] each of the images of the first class to a respective one of the printing units." (Claim 1). Karidi is directed toward pixel level identification of halftone pixels (Figs. 4-5; col. 4, lines 13-42). Identification of halftone pixels within an image has absolutely nothing to do with classifying pages within a multi-page print job so that similar pages can be sent to the same printer.

The Office Action asserts that "Karidi ... discloses sending each of the images of the first class to a respective one of the printing units (Fig 3, #100 and Fig. 1. i.e. The processed image in RGB or CMYK 22 may be routed to a print engine 24. The RGB or CMYK pixels are separated into classes. Column 4, lines 13-42)." (Action, p. 4). However, this is incorrect.

With regard to Figure 3, element 100 of Karidi, Karidi teaches that "FIG. 3 is a flow diagram illustrating the boundary technique. The boundary technique may be expressed as follows: ***In the neighborhood of every pixel, separate the neighbor pixels into two classes, i.e. dark and light*** (100)." However, this in no way can be interpreted as either "classify the images into at least a first and a second class" or "sending each of the images of the first class to a respective one of the printing units." (Claim 1). The method described in Karidi simply separates pixels within a single image, and does not classify images into a first and a second class. Further, this portion of Karidi simply does not discuss sending any number of images of a first class to a printing unit.

With regard to the Office Action's statements that "Fig. 1. i.e. The processed image in RGB or CMYK 22 may be routed to a print engine 24. ***The RGB or CMYK pixels are separated into classes.*** Column 4, lines 13-42," it is clear that this section of Karidi simply teaches sending a single processed image to a printer, whether that image is in RGB or CMYK *(see,* Karidi, col. 4, ll. 14-15), and does not teach or suggest sending each of the images of a first class to a respective one of the printing units. Further, as discussed above, Karidi simply teaches that the *pixels* within a single image are classified, and does not classify images into a first and a second class *(see,* col. 4, ll. 23-24, 29-30, and 39-42).

In contrast, claim 1 recites: "[a] printing control system, comprising a plurality of printing units, an image source providing a print job comprising a plurality of images, and a system processing unit, wherein the system processing unit is configured to receive the

plurality of images in the print job from the image source, calculate an image histogram for each image in the print job, determine a similarity of the images in the print job by comparing the calculated histograms, classify the images into at least a first and a second class based on the similarity of the histograms, and send each of the images of the first class to a respective one of the printing units." *(See also,* claims 19 and 29). This subject matter is clearly not taught or suggested by Oyumi, Yada, and Karidi.

The Supreme Court addressed the issue of obviousness in *KSR Int'l Co. v. Teleflex Inc.*, 127 S.Ct. 1727 (2007). The Court stated that the *Graham v. John Deere Co. of Kansas City*, 383, U.S. 1 (1966), factors still control an obviousness inquiry. Under the analysis required by *Graham v. John Deere*, 383 U.S. 1 (1966) to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly a printing control system, comprising a plurality of printing units, an image source providing a print job comprising a plurality of images, and a system processing unit, wherein the system processing unit is configured to receive the plurality of images in the print job from the image source, calculate an image histogram for each image in the print job, determine a similarity of the images in the print job by comparing the calculated histograms, classify the images into at least a first and a second class based on the similarity of the histograms, and send each of the images of the first class to a respective one of the printing units.

The differences between the cited prior art and the indicated claims are significant because the recitations of claims 1, 19, and 29 provide for minimizing objectionable

deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the rejection of claims 1, 19, and 29 under 35 U.S.C. § 103 and Graham should not be sustained.

Additionally, various dependent claims of the application recite subject matter that is further patentable over the cited prior art. Specific, non-exclusive examples follow.

<u>Claims 2, 20, and 30:</u>

Claim 2 recites: "[t]he system of claim 1, wherein the system processing unit is adapted to compare the calculated histograms by calculating cross-correlation values between the images in the print job based on the histograms.". Similarly, claim 20 recites: "[t]he method of claim 19, wherein comparing the histograms of the images includes calculating cross-correlation values between the images in the print job based on the histograms." Finally, claim 30 recites: "[t]he system of claim 29, wherein the processing means compares the calculated histograms by calculating cross-correlation values between the images in the print job based on the histograms."

In contrast, Oyumi, Yada, and Karidi do not teach or suggest "calculating cross-correlation values between the images in the print job based on the histograms." (Claims 2, 20, and 30). The Office Action concedes that Oyumi and Yada do "not expressly disclose wherein the system processing unit is adapted to compare the calculated histograms by calculating cross-correlation values between the images in the print job based on the histograms." (Action, p. 4).

Thus, the Office Action cites to Karidi and states that "Fig. 4 [of Karidi] is a flow diagram illustrating a cross correlation technique for imaging classification. Column 9, lines 13-67)." (Action, p. 5). However, this is incorrect. It is clear that this section of Karidi teaches "determin[ing] whether or not the current ***pixel*** should be marked as a halftone candidate." (Karidi, col. 9, lines 17-20) (emphasis added). Thus, as discussed above in connection with independent claims 1, 19, and 29, Karidi simply teaches classifying pixels within an image, and not images based on histograms. Thus, Karidi clearly cannot teach or suggest calculating cross-correlation values ***between images*** in a print job. In contrast, claims 2, 20, and 30 recite: "calculating cross-correlation values between the images in the print job based on the histograms." This subject matter is clearly not taught or suggested by Oyumi, Yada, and Karidi.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly calculating cross-correlation values between the images in the print job based on the histograms.

The differences between the cited prior art and the indicated claims are significant because the recitations of claims 2, 20, and 30 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See. e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a

rejection of claims 2, 20, and 30 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claims 2, 20, and 30 and their dependent claims should not be sustained.

Claims 3, 13, and 31:

Claim 3 recites:

> The system of claim 2, wherein the plurality of printing units includes at least a first printing unit and a second printing unit, ***wherein the number of classes equals the number of printing units and includes at least the first class and the second class, and wherein the first class of images is printed on the first printing unit and the second class of images is printed on the second printing unit.***

(Emphasis added).

Similarly, claim 13 recites: "[t]he system of claim 12, ***wherein the number of core classes is equal to the number of printing units in the system."*** (Emphasis added). Finally, claim 31 recites: "[t]he system of claim 30, wherein the plurality of printing units includes at least a first printing unit and a second printing unit, ***wherein the number of classes equals the number of printing units and includes at least a first class and a second class, and wherein the first class of images is printed on the first printing unit and the second class of images is printed on the second printing unit."*** (Emphasis added).

The Action argues in each instance that Oyumi teaches the recited "wherein the number of classes equals the number of printing units" and "wherein the first class of images is printed on the first print unit and the second class of images is printed on the second print unit." (Action, pp. 5, 7, and 9). However, nowhere in the cited portions of Oyumi is there any teaching or suggestion that "the number of classes equals the printing units." In contrast, in the cited portions of Oyumi appears to be gathering information from various printers so the various printers produce similarly sized copies of an image. (Oyumi, col. 12, lines 21-26).

Clearly, the calibration data for each printer cannot be reasonably understood as the recited "first class of images." The calibration data are numeric values which represent reduction ratios used to resize an image so that the image can be repeatably printed on any of a number of printers. (Oyumi, col. 4, line 64 –col. 5 line 7; col. 12, lines 24-26).

In contrast, claim 3 recites: "wherein the number of classes equals the number of printing units and includes at least the first class and the second class, and wherein the first class of images is printed on the first printing unit and the second class of images is printed on the second printing unit." *(See also,* claims 13 and 31). This subject matter is clearly not taught or suggested by Oyumi, Yada, and Karidi.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly wherein the number of classes equals the number of printing units and includes at least the first class and the second class, and wherein the first class of images is printed on the first printing unit and the second class of images is printed on the second printing unit..

The differences between the cited prior art and the indicated claims are significant because the recitations of claims 3, 13, and 31 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a

rejection of claims 3, 13, and 31 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claims 3, 13, and 31 should not be sustained.

Claim 4:

Claim 4 recites:

> The system of claim 2, wherein the **cross-correlation values** between the images in the print job are **normalized** and have a value of one of 0, 1, and between 0 and 1, **wherein the value is 0 when the images are most dissimilar and is 1 when the images are most similar**.

(Emphasis added).

The Action alleges that Karidi teaches the subject matter of claim 4 in a code listing which is contained Table 1 of Karidi. (Action, p. 6). Karidi states the following within the computer code: "The purpose of this piece of code is to compute the 'class_threshold': This number will ***determine the threshold from light to dark in the current window. Pixels with higher intensity than the threshold are considered light.*** The others are dark." In other words, Karidi simply teaches computer code used to determine whether a pixel in an image is to be considered a light or dark pixel. Additionally, the code listing in Table 1 of Karidi is not implementing a cross correlation method. In contrast the code states that is a “boundary technique.” (Karidi, col. 5, lines 15-25). Nowhere in this section does Karidi disclose normalization of cross-correlation values. Further, although Karidi discloses assigning values of "0" or "1," these values do not reflect dissimilarity or similarity between images, wherein the value is 0 when the images are most dissimilar and is 1 when the images are most similar.

In contrast, claim 4 recites: "[t]he system of claim 2, wherein the cross-correlation values between the images in the print job are normalized and have a value of one of 0, 1, and

between 0 and 1, wherein the value is 0 when the images are most dissimilar and is 1 when the images are most similar." This subject matter is clearly not taught or suggested by Oyumi, Yada, and Karidi.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly the system of claim 2, wherein the cross-correlation values between the images in the print job are normalized and have a value of one of 0, 1, and between 0 and 1, wherein the value is 0 when the images are most dissimilar and is 1 when the images are most similar.

The differences between the cited prior art and the indicated claims are significant because the recitations of claim 4 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 4 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claim 4 should not be sustained.

<u>Claim 5:</u>

Claim 5 recites:

> The system of claim 2, wherein the histogram for each image includes a multitude of bins each representing colors, and wherein calculating the cross-correlation values includes calculating a normalized summation of the product of each color bin for the multitude of bins.

The Action cites Karidi at col. 8, lines 32-64 as teaching a "histogram for each image includes multiple bins each representing colors." (Action, p. 6). This is incorrect. Nowhere the cited portion of Karidi is there any indication that a histogram is used. In contrast, Karidi discloses calculating color differences between pixels based on the Euclidean norms of color vectors of the pixels. (Karidi, col. 8, lines 32-64). This technique has absolutely nothing to do with a histogram.

Further, as discussed above, Karidi is not directed toward creating any type of histogram for each image as recited in claim 5. In contrast, Karidi teaches a pixel level analysis for halftone detection of individual pixels. Nowhere, does Karidi teach or suggest a histogram for each image which can be used to find similarities between images as recited in claims 1 and 5. Consequently, cited prior art does not teach or suggest "calculating the cross-correlation values includes calculating a normalized summation of the product of each color bin for the multitude of bins" as recited in claim 5.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject

matter, particularly calculating the cross-correlation values includes calculating a normalized summation of the product of each color bin for the multitude of bins.

The differences between the cited prior art and the indicated claims are significant because the recitations of claim 5 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 5 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claim 5 should not be sustained.

Claim 6:

Claim 6 recites:

> The system of claim 2, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by forming a group for each of the images in the print job, and then adding other images to the group as image members of the group when the cross-correlation value between respective images is greater than a threshold value.

The cited references do not teach or suggest, separately or in combination, classifying images "in a print job," classifying images a group based on "calculated histograms," classifying images "by forming a group for each of the images in the print job" or "adding other images to the group as image members of the group when the cross-correlation value between respective images is greater than a threshold value." (Claim 6).

The Examiner alleges that Karidi teaches this subject matter at col. 9 lines 31-35. This portion of Karidi is reproduced below in its entirety.

> Compare correlation factors with a threshold T (430). A pixel is marked as a halftone candidate (450) if at least one of the correlation factors Cor(R,G), Cor (G,B), Cor (B,R) is less than T (440). If not, i.e. if all of them are greater or equal to T, the current pixel is marked as non-halftone (460).

(Karidi, col. 9, lines 30-35).

Clearly the cited portion of Karidi does not teach or suggest the subject matter of claim 6. Specifically, nowhere Karidi does not teach or suggest classifying images "in a print job," classifying images a group based on "calculated histograms," classifying images "by forming a group for each of the images in the print job" or "adding other images to the group as image members of the group when the cross-correlation value between respective images is greater than a threshold value" as recited in claim 6.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly classifying images "in a print job," classifying images a group based on "calculated histograms," classifying images "by forming a group for each of the images in the print job" or "adding other images to the group as image members of the group when the cross-correlation value between respective images is greater than a threshold value" as recited in claim 6.

The differences between the cited prior art and the indicated claims are significant because the recitations of claim 6 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available

in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 6 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claim 6 should not be sustained.

Claim 7:

Claim 7 recites:

> The system of claim 6, wherein the threshold value is between approximately 0.8 and approximately 0.95.

The Examiner alleges that Karidi teaches the subject matter of claim 7 at col. 3, lines 32-34. This is incorrect. The "threshold value" recited in claim 7 defines cross-correlation values of calculated histograms for images in a print job. (Claims 1, 6, and 7). The threshold of 0.6-0.7 described by Karidi has nothing to do with cross-correlation values of calculated histograms for images in a print job. In contrast, the threshold discussed by Karidi refers to method for making "a decision as to whether or not a pixel belongs in a halftone area." (Karidi, col. 3, lines 32-34). This has absolutely nothing to do with the "threshold value" recited in claim 7. The Karidi threshold, in addition to being irrelevant, recites an entirely different range of values than recited in claim 7.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly the threshold value between approximately 0.8 and approximately 0.95 as recited in claim 7.

The differences between the cited prior art and the indicated claim are significant because the recitations of claim 7 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claim 7 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claim 7 should not be sustained.

<u>Claims 8, 23, and 34:</u>

Claim 8 recites:

> The system of claim 6, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also forming subgroups from the groups by regrouping groups that have image members in common.
>
> .

Claim 23 similarly recites: "[t]he method of claim 22, wherein sorting the images in the groups into classes includes **forming subgroups from the groups by merging groups that have image members in common**." (Emphasis added). Finally, claim 34 recites: "[t]he system of claim 33, wherein the processing means classifies the images the images based on the comparison of the calculated histograms by also ***forming subgroups from the groups by regrouping groups that have image members in common."*** (Emphasis added). In contrast, Oyumi, Yada, and Karidi do not teach or suggest "forming subgroups from the groups by regrouping groups that have image members in common." (Claim 8) *(see also,* claims 23 and 34). The Examiner alleges that Karidi teaches the subject matter of claim 8 at col. 4, lines 39-67. This is incorrect. Nowhere does the cited portion of Karidi teach or suggest classifying

images “based on the comparison of the calculated histograms” or “forming subgroups from the groups by regrouping groups which have image members in common.” (Claim 8). As discussed above, the pixel by pixel determination of halftone values taught by Karidi does not teach any type of classification of “images based on comparison of calculated histograms” as recited in claim 8.

In contrast, claims 8 recites: "forming subgroups from the groups by regrouping groups that have image members in common." *(See also,* claims 23 and 34). This subject matter is not taught or suggested by Oyumi, Yada, and Karidi.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly forming subgroups from the groups by regrouping groups that have image members in common.

The differences between the cited prior art and the indicated claims are significant because the recitations of claims 8, 23, and 34 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claims 8, 23, and 34 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claims 8, 23, and 34 should not be sustained.

<u>Claim 9, 24, and 35:</u>

Claim 9 recites:

> The system of claim 8, wherein the system processing unit is adapted to ***merge groups that have at least half of the image members in common into subgroups.***

(Emphasis added).

Similarly, claim 24 recites: "[t]he method of claim 23, wherein forming subgroups from the groups includes ***merging into respective subgroups groups that have at least half of the image members in common."*** (Emphasis added). Finally, claim 35 recites: "[t]he system of claim 34, wherein the processing means ***merges groups that have at least half of the image members in common into subgroups."*** (Emphasis added).In contrast, Oyumi, Yada, and Karidi do not teach or suggest merging into respective subgroups groups that have at least half of the image members in common. (Claims 9, 24, and 35).

The Examiner alleges that Fig. 3 and col. 4, lines 39-67 of Karidi teach the subject matter of claims 9, 24, and 35. (Action, pp. 6 and 8). This is incorrect. As discussed above with respect to claim 8, the pixel by pixel determination of halftone values taught by Karidi does not teach any type of classification of images based on comparison of calculated histograms or the regrouping of images which have image members in common. Nowhere in Fig. 3 and col. 4, lines 39-67 of Karidi is it taught or suggested that groups of images in a print job are "merged based on having at least half of the image members in common into subgroups" as recited in claim 9. *(See also,* claims 24 and 35). This subject matter is not taught or suggested by Oyumi, Yada, and Karidi.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and

content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly wherein the system processing unit is adapted to merge groups that have at least half of the image members in common into subgroups.

The differences between the cited prior art and the indicated claims are significant because the recitations of claims 9, 24, and 35 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claims 9, 24, and 35 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claims 9, 24, and 35 should not be sustained.

Claims 10, 11, 25, 26, 36, and 37:

Claims 10 and 11 recite: "[t]he system of claim 8, wherein the system processing unit is adapted ***to regroup image members from groups*** having less than half of the image members in common ***into subgroups*** by computing ***an average cross-correlation value of each image member of the groups with each group*** to determine the group to which the image member belongs," and "[t]he system of claim 8, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also ***forming sets from the subgroups by merging subgroups that have similar image members,"*** respectively. Claims 25, 26, 36, and 37 contain similar recitations. In contrast, Oyumi, Yada, and Karidi do not teach or suggest regrouping image members from groups into subgroups or

forming sets from subgroups by merging subgroups that have similar image members. (Claims 10, 11,25,26,36, and 37).

As discussed above in connection with the patentability of claims 8, 9, 23, 24, 34, and 35, Karidi simply does not teach or suggest arranging groups into subgroups. In this regard, Karidi also does not teach or suggest merging groups that have at least half of the images in common or regrouping image members from groups having less than half of the image members in common into subgroups. Additionally, nowhere in Karidi is it taught or suggested that "an average cross correlation value of each image member of the groups" is calculated. (Claim 10). Further, nowhere does the cited portion of Karidi teach or suggest "processing unit is adapted to regroup image members from groups having less than half of the image members in common into subgroups." (Claim 10).

In contrast, claims 10 and 11 recite: "[t]he system of claim 8, wherein the system processing unit is adapted to regroup image members from groups having less than half of the image members in common into subgroups by computing an average cross-correlation value of each image member of the groups with each group to determine the group to which the image member belongs," and "[t]he system of claim 8, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also forming sets from the subgroups by merging subgroups that have similar image members," respectively. *(See also,* claims 25, 26, 36, and 37). This subject matter is simply not taught or suggested by Oyumi, Yada, and Karidi.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content

of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly wherein the system processing unit is adapted to regroup image members from groups having less than half of the image members in common into subgroups by computing an average cross-correlation value of each image member of the groups with each group to determine the group to which the image member belongs and wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also forming sets from the subgroups by merging subgroups that have similar image members.

The differences between the cited prior art and the indicated claims are significant because the recitations of claims 10, 11, 25, 26, 36, and 37 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claims 10, 11, 25, 26, 36, and 37 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claims 10, 11, 25, 26, 36, and 37 should be not be sustained.

<u>Claims 12, 27, and 38:</u>

Claim 12 recites: "[t]he system of claim 11, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also ***forming core classes from the sets by selecting the sets with the greatest number of image members as the core classes."*** (Emphasis added). Similarly, claim 27 recites: "[t]he method of claim 26, wherein sorting the images in the groups into classes further includes ***forming***

core classes from the sets by selecting the sets with the greatest number of image members as the core classes." (Emphasis added). Finally, claim 38 recites: "[t]he system of claim 37, wherein the processing means classifies the images based on the comparison of the calculated histograms by also ***forming core classes from the sets by selecting the sets with the greatest number of image members as the core classes."*** (Emphasis added). In contrast, Oyumi, Yada, and Karidi do not teach or suggest "forming core classes from the sets by selecting the sets with the greatest number of image members as the core classes." (Claim 12) *(see also,* claims 27 and 38).

The Office Action cites to Fig. 3, steps 100 through 120 and column 4, lines 39-67 of Karidi in rejecting claims 12, 27, and 38. (Action, pp. 7 and 9). However, Karidi makes no mention of forming core classes. Further, Karidi also does not teach or suggest selecting the sets with the greatest number of image members as the core classes.

In contrast, claim 12 recites: "[t]he system of claim 11, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also forming core classes from the sets by selecting the sets with the greatest number of image members as the core classes." *(See also,* claims 27 and 38). This subject matter is clearly not taught or suggested by Oyumi, Yada, and Karidi.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly, wherein the system processing unit is adapted to classify the images

based on the comparison of the calculated histograms by also forming core classes from the sets by selecting the sets with the greatest number of image members as the core classes.

The differences between the cited prior art and the indicated claims are significant because the recitations of claims 12, 27, and 38 provide for minimizing objectionable deviations between the printed versions of similar images in a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claims 12, 27, and 38 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claims 12, 27, and 38 should not be sustained.

<u>Claims 17 and 18:</u>

Claim 17 recites: "[t]he system of claim 1, wherein the printing units are each ***print engines contained in a single printer."*** (Emphasis added). Claim 18 similarly recites: "[t]he system of claim 1, wherein the printing units are each ***printheads contained in a single printer."*** (Emphasis added). In contrast, Oyumi, Yada, and Karidi do not teach or suggest "wherein the printing units are each print engines [or printheads] contained in a single printer." (Claims 17 and 18).

The Office Action cites to Fig. 2 of Oyumi and states that the *single* printer of Fig. 2 may be interpreted as a motor (not shown in Fig. 2) or a developing unit. (Action, p. 9). However, this is incorrect. Oyumi clearly teaches that "reference numbers 301 and 302 each denote a printer," and Fig. 2 clearly depicts the printers 301 and 302 as separate elements.

(Oyumi, Fig. 2, and col. 6, lines 32-33). Thus, Oyumi can not teach or suggest sending different groups of images to printing units in a single printer.

In contrast, claims 17 and 18 recite: "[t]he system of claim 1, wherein the printing units are each print engines contained in a single printer," and "[t]he system of claim 1, wherein the printing units are each printheads contained in a single printer," respectively. This subject matter is clearly not taught or suggested by Oyumi, Yada, and Karidi.

Again, under the analysis required by *Graham v. John Deere Co. of Kansas City, 383* U.S. 1 (1966), to support a rejection under § 103, the scope and content of the prior art must first be determined, followed by an assessment of the differences between the prior art and the claim at issue in view of the ordinary skill in the art. In the present case, the scope and content of the prior art, as evidenced by Oyumi, Yada, and Karidi, did not include the claimed subject matter, particularly, wherein the printing units are each print engines contained in a single printer, and wherein the printing units are each printheads contained in a single printer.

The differences between the cited prior art and the indicated claims are significant because the recitations of claims 17 and 18 provide for minimizing objectionable deviations between the printed versions of similar images in a print job and maximizing the speed and efficiency of a print job by sending a class of similar images to one printing unit. *(See, e.g.* Appellant's original specification, p. 4, line 5 through page 5, line 4). Thus, the claimed subject matter provides features and advantages not known or available in the cited prior art. Consequently, the cited prior art will not support a rejection of claims 17 and 18 under 35 U.S.C. § 103 and *Graham.* Therefore, for at least the reasons explained here, the rejection based on Oyumi, Yada, and Karidi of claims 17 and 18 should not be sustained.

Claims 14 and 15:

The rejection of claims 14 and 15 should not be sustained for at least the same reasons given above in favor of the patentability of claim 12.

In view of the foregoing, it is submitted that the final rejection of the pending claims is improper and should not be sustained. Therefore, a reversal of the Rejection of May 5, 2009 is respectfully requested.

Respectfully submitted,

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VIII. CLAIMS APPENDIX

1. (previously presented) A printing control system, comprising:

a plurality of printing units;

an image source providing a print job comprising a plurality of images; and

a system processing unit, wherein the system processing unit is configured to receive the plurality of images in the print job from the image source, calculate an image histogram for each image in the print job, determine a similarity of the images in the print job by comparing the calculated histograms, classify the images into at least a first and a second class based on the similarity of the histograms, and send each of the images of the first class to a respective one of the printing units.

2. (original) The system of claim 1, wherein the system processing unit is adapted to compare the calculated histograms by calculating cross-correlation values between the images in the print job based on the histograms.

3. (original) The system of claim 2, wherein the plurality of printing units includes at least a first printing unit and a second printing unit, wherein the number of classes equals the number of printing units and includes at least the first class and the second class, and wherein the first class of images is printed on the first printing unit and the second class of images is printed on the second printing unit.

4. (original) The system of claim 2, wherein the cross-correlation values between the images in the print job are normalized and have a value of one of 0, 1, and between 0 and

1, wherein the value is 0 when the images are most dissimilar and is 1 when the images are most similar.

5. (original) The system of claim 2, wherein the histogram for each image includes a multitude of bins each representing colors, and wherein calculating the cross-correlation values includes calculating a normalized summation of the product of each color bin for the multitude of bins.

6. (original) The system of claim 2, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by forming a group for each of the images in the print job, and then adding other images to the group as image members of the group when the cross-correlation value between respective images is greater than a threshold value.

7. (original) The system of claim 6, wherein the threshold value is between approximately 0.8 and approximately 0.95.

8. (original) The system of claim 6, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also forming subgroups from the groups by regrouping groups that have image members in common.

9. (original) The system of claim 8, wherein the system processing unit is adapted to merge groups that have at least half of the image members in common into subgroups.

10. (original) The system of claim 8, wherein the system processing unit is adapted to regroup image members from groups having less than half of the image members in common into subgroups by computing an average cross-correlation value of each image member of the groups with each group to determine the group to which the image member belongs.

11. (original) The system of claim 8, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also forming sets from the subgroups by merging subgroups that have similar image members.

12. (original) The system of claim 11, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also forming core classes from the sets by selecting the sets with the greatest number of image members as the core classes.

13. (original) The system of claim 12, wherein the number of core classes is equal to the number of printing units in the system.

14. (original) The system of claim 12, wherein the system processing unit is adapted to classify the images based on the comparison of the calculated histograms by also

forming final classes from the core classes by adding any remaining image members of the sets to the core classes with which the sets are most similar.

15. (original) The system of claim 14, wherein the system processing unit is adapted to determine which sets are most similar to which of the core classes by a progressive process wherein the number of image members in a core class increases each time a set is merged into one of the core classes.

16. (original) The system of claim 1, wherein the printing units are each individual printers operatively coupled to the system processing unit.

17. (original) The system of claim 1, wherein the printing units are each print engines contained in a single printer.

18. (original) The system of claim 1, wherein the printing units are each printheads contained in a single printer.

19. (original) A method of processing a print job including multiple images with a printing system including multiple printing units, comprising:

identifying the number of printing units in the system, the system including at least a first printing unit and a second printing unit;

calculating a histogram for each image in the print job;

comparing the histograms of the images in the print job to determine similarity between the images;

grouping the images into groups based on the similarity of the comparisons of the histograms;

sorting the images in the groups into classes, including at least a first class and a second class; and

sending the images to the printing units for printing, including sending the images from the first class to the first printing unit and sending the images from the second class to the second printing unit.

20. (original) The method of claim 19, wherein comparing the histograms of the images includes calculating cross-correlation values between the images in the print job based on the histograms.

21. (original) The method of claim 20, wherein the histogram for each image includes a multitude of bins each representing colors, and wherein calculating the cross-correlation values includes calculating a normalized summation of the product of each color bin for the multitude of bins.

22. (original) The method of claim 20, wherein grouping the images into groups includes forming a group for each of the images in the print job, and then adding other images to the group as image members of the group when the cross-correlation value between respective images is greater than a threshold value.

23. (original) The method of claim 22, wherein sorting the images in the groups into classes includes forming subgroups from the groups by merging groups that have image members in common.

24. (original) The method of claim 23, wherein forming subgroups from the groups includes merging into respective subgroups groups that have at least half of the image members in common.

25. (original) The method of claim 23, wherein forming subgroups from the groups includes sorting into respective subgroups image members from groups that have less than half of the image members in common by computing an average cross-correlation value of each image member of the groups with each group to determine the group to which the image member belongs.

26. (original) The method of claim 23, wherein sorting the images in the groups into classes further includes forming sets from the subgroups by merging subgroups that have similar image members.

27. (original) The method of claim 26, wherein sorting the images in the groups into classes further includes forming core classes from the sets by selecting the sets with the greatest number of image members as the core classes.

28. (original) The method of claim 27, wherein sorting the images in the groups into classes further includes forming the classes from the core classes by adding any remaining image members of the sets to the core classes with which the sets are most similar.

29. (previously presented) A printing control system, comprising:

a plurality of printing units;

an image source providing a print job comprising a plurality of images; and

processing means for receiving the plurality of images in the print job from the image source, for calculating an image histogram for each image in the print job, for comparing the calculated histograms and determining a similarity of the images in the print job, for classifying the images into classes based on the similarity of the comparison, and for sending each of the images in a class to a respective one of the printing units.

30. (original) The system of claim 29, wherein the processing means compares the calculated histograms by calculating cross-correlation values between the images in the print job based on the histograms.

31. (original) The system of claim 30, wherein the plurality of printing units includes at least a first printing unit and a second printing unit, wherein the number of classes equals the number of printing units and includes at least a first class and a second class, and wherein the first class of images is printed on the first printing unit and the second class of images is printed on the second printing unit.

32. (original) The system of claim 30, wherein the histogram for each image includes a multitude of bins each representing colors, and wherein calculating the cross-correlation values includes calculating a normalized summation of the product of each color bin for the multitude of bins.

33. (original) The system of claim 30, wherein the processing means classifies the images based on the comparison of the calculated histograms by forming a group for each of the images in the print job, and then adding other images to the group as image members of the group when the cross-correlation value between respective images is greater than a threshold value.

34. (original) The system of claim 33, wherein the processing means classifies the images based on the comparison of the calculated histograms by also forming subgroups from the groups by regrouping groups that have image members in common.

35. (original) The system of claim 34, wherein the processing means merges groups that have at least half of the image members in common into subgroups.

36. (original) The system of claim 34, wherein the processing means regroups image members from groups having less than half of the image members in common into subgroups by computing an average cross-correlation value of each image member of the groups with each group to determine the group to which the image member belongs.

37. (original) The system of claim 34, wherein the processing means classifies the images based on the comparison of the calculated histograms by also forming sets from the subgroups by merging subgroups that have similar image members.

38. (original) The system of claim 37, wherein the processing means classifies the images based on the comparison of the calculated histograms by also forming core classes from the sets by selecting the sets with the greatest number of image members as the core classes.

39. (original) The system of claim 38, wherein the processing means classifies the images based on the comparison of the calculated histograms by also forming final classes from the core classes by adding any remaining image members of the sets to the core classes with which the sets are most similar.

IX. Evidence Appendix

None

X. Related Proceedings Appendix

None